

# Student Findings from the Spring 2006 Irving Laptop Survey<sup>1</sup>

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## Introduction

In October 2003, the Texas Education Agency (TEA) was awarded a federal grant for a Technology Immersion Pilot (TIP) project to produce scientifically-based research evidence about the effectiveness of educational technology in K-12 education. According to the Texas Education Agency (TEA), the funding source, the goal of TIP is to:

“increase the academic progress of students who are participating in the pilot project by immersing the campus with appropriate innovative technologies including, but not limited to, wireless mobile computing devices, software, online formative assessment tools, and online resources.”

<http://www.tea.state.tx.us/technology/tip/>

TIP leverages \$14.5 million in Title II, Part D (NCLB) federal technology funds to support technology immersion Implementation (TEA, 2006).

Twenty-two of the school districts selected for TIP are involved as treatment sites for middle school 1-to-1 computing immersion (TEA, 2006), with the scientifically-based evaluation component of the Texas Technology Immersion Pilot (eTxTIP) project funded by a \$1.95 million dollar grant from the U.S. Department of Education through the Texas Education Agency over three years (eTxTIP, 2006).

In addition to the 22 regular treatment districts, Irving Independent School District (ISD) was selected during the TIP competition to implement one-student-to-one-computing on three campuses, forming a vertical team of elementary, middle and high schools. This award leveraged a local bond initiative to provide laptops to all 9600 high school students in the district. The Institute for the Integration of Technology into Teaching & Learning at the University of North Texas was selected to evaluate this vertical integration initiative (Owen, Farsaii, Knezek, & Christensen, 2005).

Thus Irving High School, de Zavala Middle School, and Lively Elementary School formed the Irving ISD vertical team for this project. The three campuses shared \$850,000 over a two-year period to implement the program. Every student had a personal computing device with Dell laptops for most and AlphaSmarts for the younger grades. All classrooms had a data projector, teacher laptop, printer and wireless access.

This report addresses one component of the Irving ISD spring 2006 initiative to gather data for the evaluation of the Technology Immersion Pilot (TIP) grant. Findings in this report are based on surveys completed by middle school students from two Irving ISD

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<sup>1</sup> By Rhonda Christensen and Gerald Knezek

middle schools, one school involved in the grant with access to laptops and a comparison school as well as the four high schools, the latter of which all of which had laptop access.

### **Evaluation Design**

Because the treatment schools could not be randomly assigned, carefully matched comparison campuses without 1-to-1 laptops were selected for assessment of the impact of the 1-to-1 treatment at the elementary and middle school levels. No comparison school was possible at the high school level because all high schools in Irving had laptops for all students at the beginning of the TIP project.

The comparison middle school included in this report was selected by applying scaling methods to demographic indicators from the state database. Two schools very similar to de Zavala Middle School were presented to the Irving ISD project personnel and one was selected based on practical, feeder-school issues.

### **Measurement Indices**

Online surveys gathering attitudes toward computers and learning dispositions, levels of technology proficiency and use, and specific perceptions of the laptop computer program related to many areas of education and society, were administered to the students during May 2005. The primary instrument was the Computer Attitude Questionnaire (CAQ), whose core is a Likert scale of 80 items with five multiple-choice responses ranging from 1 = strongly disagree to 5 = strongly agree (Knezek & Christensen, 1995). Additional scales were utilized for the Laptop Project evaluation, including standard comparison items from the Technology Proficiency Self Assessment (Ropp, 1999), individual skill items in selected technology areas, and customized items produced by the consultants in conjunction with the Irving ISD school leadership to assess perceived impact of the initiative and compare student perceptions to those of their teachers.

### **Instrument Reliability**

Surveys were completed by 3449 Grade 6-12 students from the four Irving high schools, a TIP project treatment middle school and a comparison middle school. An analysis of the reliability (measurement consistency) of the CAQ was carried out on this group of subjects. As shown in Table 1, internal consistency reliability indices (Cronbach's Alpha) ranged from  $r = .72$  to  $r = .90$  for the eight subscales examined. According to the guidelines provided by DeVellis (1991), these fall in the range of "respectable" to "very good":

DeVellis Reliability Guidelines	
Below .60	Unacceptable
Between .60 and .65	Undesirable
Between .65 and .70	Minimally acceptable
Between .70 and .80	Respectable
Between .80 and .90	Very good
Much above .90	Consider shortening the scale
(DeVellis, 1991, p.85)	

**Table 1.**  
*CAQ Spring 2006 Reliabilities from Irving ISD Students*

Scale	Alpha	No. Items	N
Anxiety	.83	8	3412
Computer Importance	.81	6	3376
Computer Enjoyment	.75	9	3392
Attitude Toward School	.71	6	2703
TPSA-Email	.89	3	3396
TPSA-WWW	.75	4	3389
TPSA-IA	.75	3	3383
TPSA - All	.90	11	3280

### Background Information on Subjects

As shown in Tables 2-5, the 3449 students completing surveys for this study represented Grades 6-12 and predominately represented ages 11-18. Slightly more respondents were female (50.9%) than male (49.1%). Predominate ethnic identification areas for the respondents were Hispanic (56%) and White (23%). Representation was from the four high schools, a TIP treatment middle school and a comparison middle school. Each of the high schools has been in the laptop project for at least three years. The 2004-2005 school year was the first year of one-to-one implementation for de Zavala Middle School, the TIP treatment school, thus this was de Zavala's second year in the project.

**Table 2.**

Irving Students by School, 2006

School	Frequency	Percent
Irving High School	195	5.7
MacArthur High School	785	22.8
Nimitz High School	603	17.5
The Academy of Irving	551	16.0
Comparison Middle School	691	20.0
De Zavala Middle School	624	18.1
	3449	100.0

**Table 3.**

Irving Student Frequencies by Grade Level, 2006

Grade	Frequency	Percent
6.00	419	12.1
7.00	442	12.8
8.00	454	13.2
9.00	564	16.4
10.00	478	13.9
11.00	532	15.4
12.00	560	16.2
Total	3449	100.0

**Table 4.**

Irving Student Frequencies by Ethnicity

Ethnicity	Frequency	V Percent
Hispanic, Latino, or Spanish origin	1852	55.7
American Indian or other Native American	51	1.5
Asian American or Pacific Islander	185	5.6
Black/African American	297	8.9
White	756	22.8
Other	182	5.5
Did not Respond	126	
Total	3449	100.0

**Table 5.**

Irving Student Frequencies by Gender

Gender	Frequency	V Percent
Male	1695	49.1
Female	1754	50.9
Total	3449	100.0

## **Laptop and Related Computer Usage for High School, Middle School Treatment and Comparison School Students**

At the time of this study, the four high schools had been using the laptops for at least three years, with the Academy had been using laptops for five years. Data for 2006 is being reported on the high schools, the treatment middle school (de Zavala) that began using laptops in 2004-2005 and a middle school that was selected as a comparison because they are not part of the laptop initiative. For Tables 6 – 15, the “a” denotes the high school level, the “b” denotes de Zavala Middle School (treatment middle school) and, when appropriate to compare, “c” denotes the comparison middle school.

High School Computer Use. As shown in Tables 6-12, 91% of the students reported taking their laptop home every day and 63% reported using their laptop at least two hours per week at home. Seventy-four percent (74.4%) reported they have access to another computer at home and more than half (72%) reported they also use it at home at least two hours per week. Seventy-four percent (73.6%) reported they have access to the Internet at home (up from 69% last year), and 77.4% reported they use their laptop on the Internet at home two or more hours per week.

Regarding school use and technology, many (84.7%) of the high school students reported using the computer more than two hours per week at school while 82% reported using the Internet more than two hours per week (see Tables 13 and 14).

De Zavala Middle School Computer Use. As shown in Tables 6-12, 91% of the students at de Zavala MS reported taking their laptop home every day and 73.2% reported using their laptop at least two hours per week at home. Sixty percent (60.4%) reported they have access to another computer at home and close to half (44.9%) reported they also use it at home at least two hours per week. Sixty-nine percent (69.2%) reported they have access to the Internet at home, and half (50.1%) reported they use their laptop on the Internet at home two or more hours per week. The percentage of those who reported using their laptops at home more than ten hours per week went from 23% in 2005 to 16.8% in 2006. Only 33% reported using another computer on the Internet at home so apparently most of the students who have Internet access are using their laptops on the Internet.

With regard to historical trends, fewer students reported taking their laptops home this year (90.5%) compared to last year (94.7%). More (5.6%) reported never taking them home this year compared to last year (2.2%). From 2005 to 2006, there was a 9% increase in the number of students at de Zavala MS who reported having access to the Internet at home.

Computer Use at the Comparison Middle School. As shown in Table 8c, 68.6% of the students in the comparison school reported having access to a computer at home (up from 58% in 2005) and 52% reported using that computer two or more hours per week. Only 48.6% of these students reported having Internet access at home. Forty-one percent

(41.4%) of these students reported using a computer at home on the Internet more than two hours per week (up from 33.2% in 2005). That is in comparison to the 50% from the treatment middle school who reported using the Internet at home more than two hours per week. As shown in Table 13c, 65.6% of the students in the comparison school reported using a computer 0-1 hours per week compared to the treatment middle school in which 76% reported using the computer at school more than two hours per week. A similar trend exists in the use of the Internet at school, as shown in Tables 14b and 14c.

When compared with the treatment middle school, a greater percentage of students at the comparison middle school reported having access to a computer at home, yet the treatment school students use computers more at home (including their laptops). From 2005 to 2006, there was an 8% increase in the number of student at the comparison middle school who reported having access to the Internet at home.

Use by Year in School. As shown in Table 15, 27% of the students completing surveys were in their first year of the Laptop Program, while 27.6% were in their second year. Twenty-eight percent (28.4%) were in their third year and 15.7% in their fourth year.

**Table 6a.**

*How often do you take your laptop home? (Combined High Schools)*

	Frequency	Percent
Every Day (1)	1931	90.5
2-3 times a week	66	3.1
1 time a week	19	.9
2-3 times/month	11	.5
1 time a month	9	.4
Never	98	4.6
Total	2134	100.0

**Table 6b.**

*How often do you take your laptop home? (de Zavala MS, Treatment School)*

	Frequency	Percent
Every Day (1)	565	90.5
2-3 times a week	22	3.5
1 time a week	2	.3
2-3 times/month	0	0
1 time a month	0	0
Never	35	5.6
Total	624	100.0

**Table 7a.***How many hours per week do you use your laptop at home? (Combined High Schools)*

Hours	Frequency	Percent
0-1 hours	620	29.1
2-4 hours	723	33.9
5-10 hours	459	21.5
More than 10 hours	332	15.6
Total	2134	100.0

**Table 7b.***How many hours per week do you use your laptop at home? (de Zavala MS, Treatment School)*

Hours	Frequency	Percent
0-1 hours	167	26.8
2-4 hours	226	36.2
5-10 hours	126	20.2
More than 10 hours	105	16.8
Total	624	100.0

**Table 8a.***Do you have access to another computer at home? (Combined High Schools)*

Home Access	Frequency	Percent
No	547	25.6
Yes	1587	74.4
Total	2134	100.0

**Table 8b.***Do you have access to another computer at home? (de Zavala MS, Treatment School)*

Home Access	Frequency	Percent
No	247	39.6
Yes	377	60.4
Total	624	100

**Table 8c.***Do you have access to a computer at home? (Comparison Middle School)*

Home Access	Frequency	Percent
No	217	31.4
Yes	474	68.6
Total	691	100

**Table 9a.***How many hours do you use that computer at home? (Combined High Schools)*

Hours	Frequency	Percent
0-1 hour	966	45.3
2-4 hours	570	26.7
5-10 hours	331	15.5
More than 10 hours	267	12.5
Total	2134	100.0

**Table 9b.***How many hours do you use that computer at home? (de Zavala MS, Treatment School)*

Hours	Frequency	Percent
0-1 hour	344	55.1
2-4 hours	180	28.8
5-10 hours	59	9.5
More than 10 hours	41	6.6
Total	624	100

**Table 9c.***How many hours do you use that computer at home? (Comparison Middle School)*

Hours	Frequency	Percent
0-1 hour	335	48.5
2-4 hours	224	32.4
5-10 hours	88	12.7
More than 10 hours	44	6.4
Total	691	100

**Table 10a.***Do you have access to the Internet at home? (Combined High Schools)*

Home Internet Access	Frequency	Percent
No	564	26.4
Yes	1570	73.6
Total	2134	100.0

**Table 10b.***Do you have access to the Internet at home? (de Zavala MS, Treatment School)*

Home Internet Access	Frequency	Percent
No	192	30.8
Yes	432	69.2
Total	624	100

**Table 10c.***Do you have access to the Internet at home? (Comparison Middle School)*

Home Internet Access	Frequency	Percent
No	355	51.4
Yes	336	48.6
Total	691	100

**Table 11a.***How many hours per week do you use your school laptop on the Internet at home? (Combined High Schools)*

Hours	Frequency	Percent
0-1 hour	1228	57.5
2-4 hours	425	19.9
5-10 hours	270	12.7
More than 10 hours	211	9.9
Total	2134	100.0

**Table 11b.***How many hours per week do you use your school laptop on the Internet at home? (de Zavala MS, Treatment School)*

Hours	Frequency	Percent
0-1 hour	312	50.0
2-4 hours	167	26.8
5-10 hours	91	14.6
More than 10 hours	54	8.7
Total	624	100.0

**Table 12a.***How many hours per week do you use other computers on the Internet at home? (Combined High Schools)*

Hours	Frequency	Percent
0-1 hour	1142	53.5
2-4 hours	473	22.2
5-10 hours	297	13.9
More than 10 hours	222	10.4
Total	2134	100.0

**Table 12b.**

*How many hours per week do you use other computers on the Internet at home? (de Zavala MS, Treatment School)*

Hours	Frequency	Percent
0-1 hour	421	67.5
2-4 hours	128	20.5
5-10 hours	37	5.9
More than 10 hours	38	6.1
Total	624	100.0

**Table 12c.**

*How many hours per week do you use a computer on the Internet at home? (Comparison Middle School)*

Hours	Frequency	Percent
0-1 hour	405	58.6
2-4 hours	175	25.3
5-10 hours	71	10.3
More than 10 hours	40	5.8
Total	691	100

**Table 13a.**

*How often do you use a computer at school? (per week) (Combined High Schools)*

Hours	Frequency	Percent
0-1 hour	326	15.3
2-4 hours	757	35.5
5-10 hours	609	28.5
More than 10 hours	442	20.7
Total	2134	100.0

**Table 13b.**

*How often do you use a computer at school? (per week) (de Zavala MS, Treatment School)*

Hours	Frequency	Percent
0-1 hour	148	23.7
2-4 hours	296	47.4
5-10 hours	133	21.3
More than 10 hours	47	7.5
Total	624	100.0

**Table 13c.***How often do you use a computer at school? (per week) (Comparison Middle School)*

Hours	Frequency	Percent
0-1 hour	453	65.6
2-4 hours	207	30.0
5-10 hours	29	4.2
More than 10 hours	2	0.3
Total	624	100

**Table 14a.***How many hours do you spend on the Internet at school? (per week) (Combined High Schools)*

Hours	Frequency	Percent
0-1 hour	392	18.4
2-4 hours	943	44.2
5-10 hours	529	24.8
More than 10 hours	270	12.7
Total	2134	100.0

**Table 14b.***How many hours do you spend on the Internet at school? (per week) (de Zavala MS, Treatment School)*

Hours	Frequency	Percent
0-1 hour	239	38.3
2-4 hours	273	43.8
5-10 hours	90	14.4
More than 10 hours	22	3.5
Total	624	100.0

**Table 14c.***How many hours do you spend on the Internet at school? (per week) (Comparison Middle School)*

Hours	Frequency	Percent
0-1 hour	505	73.1
2-4 hours	170	24.6
5-10 hours	14	2.0
More than 10 hours	2	0.3
Total	691	100

**Table 15a.**

*How many years have you participated in the Irving Laptop Program?(Four High Schools)*

Participation	Frequency	Percent
This is my first year.	575	26.9
This is my second year.	589	27.6
This is my third year.	605	28.4
This is my fourth year.	335	15.7
I am not participating.	30	1.4
Total	2134	100.0

**Table 15b.**

*How many years have you participated in the Irving Laptop Program?( Middle School Treatment)*

Participation	Frequency	Percent
This is my first year.	219	35.1
This is my second year.	380	60.9
This is my third year.	7	1.1
This is my fourth year.	1	0.2
I am not participating.	17	2.7
Total	624	100.0

### **Summary of Middle School Treatment versus Comparison Data Regarding Access and Use**

The quantitative student data gathered for this project reiterated the findings about the success of the professional development activities based on teacher data. Specifically, the overwhelming majority (91%) of the TIP Program students in middle school reported they take their laptop home "every day" and 73% reported using it at home two or more hours per week.

### **Computer Attitudes and Technology Skills**

Summary statistics for computer attitudes and technology skills of Irving high school students for 2004, 2005, and 2006 are presented in Table 16. In Tables 17, each of the descriptive statistics are presented by high school.

**Table 16.**

*Descriptive Statistics for Students from the Four Irving High Schools on Computer Attitude Questionnaire Scales, 2004, 2005 and 2006*

	N	Mean	Std. Dev	N	Mean	Std. Dev	Effect Size 04-05	N	Mean	Std. Dev.
	2004			2005				2006		
Computer Enjoyment	3996	4.01	.57	2536	4.03	.57	.04	2134	4.02	.58
Computer Importance	3996	3.95	.73	2536	3.95	.77	.00	2130	4.00	.68
Computer Anxiety	3996	4.15	.66	2536	4.15	.66	.00	2134	4.15	.69
Attitude Toward School	3996	2.87	.75	2536	3.00	.72	.18	2134	3.01	.78
Tech. Proficiency (TP) Email	3996	4.26	.90	2536	3.99	1.10	-.27	2134	4.20	.97
TP WWW	3996	3.97	.84	2536	3.79	.92	-.21	2134	3.96	.88
TP Integrated Applications	3996	3.95	.87	2536	3.80	.92	-.17	2134	3.96	.90
TP Skill	3996	3.92	.76	2536	3.50	.76	-.55	2134	3.66	.75

The number of students reporting data from Irving HS went from 682 in 2005 to 195 in 2006 but all eight of the indices reported in Table 17 went up. In 2005 there were 1008 cases of student data from MacArthur HS and 785 in 2006. All the skills measures went up but the attitudinal measures stayed largely the same. Nimitz HS reported quite a bit more data in 2006 (603) than 2005 (307). Their skills and attitudes remained largely the same with the skills going up somewhat. The Academy had a similar number report data in 2006 (551) as in 2005 (539). Each of the indices was more positive in attitudinal measures and the skills level reported also was higher.

**Table 17.**

*Descriptive Statistics for Students from the Four Irving High Schools by High School on Computer Attitude Questionnaire Scales, 2006*

	Irving HS			MacArthur HS			Nimitz HS			The Academy		
	N	Mean	Std. Dev	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.
Computer Enjoyment	195	4.20	1.0	785	4.00	.57	603	3.98	.60	551	4.07	.57
Computer Importance	194	4.05	.61	784	4.00	.64	601	3.89	.77	551	4.09	.62
Computer Anxiety	195	4.26	.66	785	4.09	.73	603	4.13	.69	551	4.23	.64
Attitude Toward School	195	3.06	.77	785	3.05	.76	603	2.81	.82	551	3.16	.71
TP-Email	195	4.20	1.01	785	4.18	.94	603	4.15	1.03	551	4.27	.91
TP-WWW	195	3.94	.95	785	3.93	.84	603	3.90	.93	551	4.06	.82
TP-IA	195	4.07	.90	785	3.94	.86	603	3.87	.97	551	4.06	.84
TP SKILL	195	3.70	.80	785	3.63	.70	603	3.60	.82	551	3.75	.70

As shown in Table 18, five of the eight attitudinal and competency measures were significantly ( $p < .05$ ) different between the treatment and comparison middle schools. Interestingly, the comparison school was higher on Computer Enjoyment, Computer Importance, and (lack of) Anxiety. The treatment school was significantly higher for Attitude Toward School.

For measures of technology use (home use, WWW use and school use), the treatment school was significantly higher ( $p < .0005$ ) in reported use than the comparison school, with an especially large effect (Cohen's  $d = 1.02$ ; Cohen, 1996) on school use. Positive treatment effect sizes generally ranged from large for school computer use ( $ES = 1.02$ ), to moderate for home computer use ( $ES = .52$ ), to small for WWW use ( $ES = .20$ ), according to guidelines established by Cohen (1969) of large effect = .8, moderate effect = .5, and small effect = .2. However, even in the case of Attitude Toward School, the relatively small effect (.14) applied across and entire school can be considered important according to guidelines provided by the North Central Regional Educational Laboratory (NCREL 2002). NCREL examples illustrate that if the effect had been on student achievement, a gain of  $ES = .1$  would be roughly equivalent to students in the treatment school learning one additional month of content, compared to comparison school students, over the course of a school year (NCREL, 2002).

Negative effect sizes shown in Table 18 are also worthy of examination. For example, the negative effect size of  $-.41$  for Computer Enjoyment may indicate that middle school students in the treatment school perceived working with computers more as “work” than their comparison school counterparts, even as the positive effect size for Attitude Toward School appears to indicate the laptop-based initiative promoted a more positive Attitude

Toward School among treatment school students. Effect sizes as well as statistical significance measures for major measurement indices are shown in Table 18.

**Table 18.**

*Descriptive Statistics for Students from the Treatment and Comparison Middle Schools on Computer Attitude Questionnaire Scales, 2006*

	N	Mean	Std. Dev.	N	Mean	Std. Dev.	Sig.	ES
	Treatment			Comparison				
Home Use	624	2.27	1.03	691	1.77	.90	.000	.52
WWW Use	624	1.82	.98	691	1.63	.89	.000	.20
School Use	624	2.13	.86	691	1.39	.58	.000	1.02
Computer	624	4.11	.52	691	4.31	.46	.000	-.41
Enjoyment								
Computer	622	4.00	.68	691	4.17	.58	.000	-.27
Importance								
Computer	624	4.16	.65	691	4.26	.54	.001	-.17
Anxiety								
Attitude Toward	624	3.16	.82	691	3.05	.76	.016	.14
School								
TP- Email	624	3.87	1.07	691	3.76	1.04	.075	.10
TP- WWW	624	3.62	.88	691	3.78	.74	.001	-.20
TP- Integrated	624	3.67	.90	691	3.75	.83	.091	-.09
Applications								
TP All Skills	624	3.39	.72	691	3.43	.64	.272	-.06

### Perceptions of Laptops and the Laptop Initiative

Customized items were developed to assess student perceptions of their uses of laptop technology and of the laptop program in general. These are presented in individual sections in the narrative that follows.

Greatest Benefit of Laptops. As shown in Table 19a, most Irving high school students (56%) felt that the greatest benefit of the laptop initiative is that students can learn more. The percentages for the 2006 data from the four high schools were very similar to the 2004 and 2005 data. The top three choices by Irving students match the top three nationwide: 1) students can learn more, 2) school would be more fun, and 3) student projects would be better (NetDay, 2004).

As shown in Table 19b, most middle school students (58% and 52% for treatment and comparison schools respectively) felt that the greatest benefit of the laptop initiative is that students can learn more. Both schools also rated the second highest benefit as “School is more fun”.

**Table 19a.**

*What do you think is the #1 benefit of attending a school that has lots of technology available to everyone?(Combined High Schools)*

	Frequency	Percent
Students can learn more.	1184	55.5
Students get along better.	50	2.3
Students get higher grades.	68	3.2
Student projects are better.	183	8.6
Group projects are easier to do.	167	7.8
School publications are better.	29	1.4
Teachers communicate better with students.	96	4.5
Teachers communicate better with other teachers.	15	.7
Family members and parents can be more involved with my schoolwork and our school.	60	2.8
School is more fun.	256	12.0
Did Not Respond	26	1.2
Total	2134	100.0

**Table 19b.**

*What do you think is the #1 benefit of attending a school that has lots of technology available to everyone?(Middle School Treatment and Comparison Schools)*

	Frequency		Percent	
	De Zavala MS (Treatment)	Comparison MS	De Zavala MS (Treatment)	Comparison MS
Students can learn more.	360	356	57.7	51.5
Students get along better.	24	11	3.8	1.6
Students get higher grades.	49	74	7.9	10.7
Student projects are better.	36	46	5.8	6.7
Group projects are easier to do.	34	50	5.4	7.2
School publications are better.	3	4	.5	.6
Teachers communicate better with students.	7	16	1.1	2.3
Teachers communicate better with other teachers.	1	2	.2	.3
Family members and parents can be more involved with my schoolwork and our school.	16	23	2.6	3.3
School is more fun.	90	102	14.4	14.8
Did Not Respond	4	7	.6	1.0
Total	624	691	100.0	100.0

Feelings About Technology. As shown in Table 20a, the most commonly-selected feeling among high school students in Irving was that they enjoy working with technology and learning new ways to use it. This category was selected by 53% of the respondents (same as 2005). Seventeen percent (n = 365) reported that they go beyond this stage to the point where they “often help friends with their technology problems and like showing them how to use technology in different ways.” Only 6% reported that they “avoid using technology as much as possible”.

Regarding the middle schools in their feeling about using technology, they were both similar in the break-out of responses. The comparison middle school had the highest percentage (73%) of all these schools in their feeling that they enjoy working with technology and learning new ways to use it

**Table 20a.**

*Which of these statements best describes your feeling about using technology?  
(Combined High Schools)*

	Frequency	Percent
I avoid using technology as much as possible.	121	5.7
I use technology a lot but it’s just a tool for me, not a hobby.	473	22.2
I enjoy working with technology and learning new ways for me to use it.	1139	53.4
I often help my friends with their technology problems and I like showing them how to use technology in different ways	365	17.1
Did Not Respond	36	1.7
Total	2134	100.0

**Table 20b.**

*Which of these statements best describes your feeling about using technology?  
(de Zavala Middle School)*

	Frequency	Percent
I avoid using technology as much as possible.	58	9.3
I use technology a lot but it’s just a tool for me, not a hobby.	126	20.2
I enjoy working with technology and learning new ways for me to use it.	334	53.5
I often help my friends with their technology problems and I like showing them how to use technology in different ways	98	15.7
Did Not Respond	8	1.3
Total	624	100.0

**Table 20c.**

*Which of these statements best describes your feeling about using technology?  
(Comparison Middle School)*

	Frequency	Percent
I avoid using technology as much as possible.	20	2.9
I use technology a lot but it's just a tool for me, not a hobby.	90	13.0
I enjoy working with technology and learning new ways for me to use it.	506	73.2
I often help my friends with their technology problems and I like showing them how to use technology in different ways	72	10.4
Did Not Respond	3	.4
Total	691	100.0

Free Time Use of Technology. The dominant form of free-time use of technology was “talking/emailing with friends and family members.” As shown in Table 21, 48% of the high school respondents reported this as their number one use. Playing games was a much less important use for this group of students than for the nation as a whole (NetDay, 2004).

As shown in Tables 21b and 21c, the middle school response rates were similar to the high school percentages. Notable was the reported frequency and percentage for the number one item of talking/emailing with friends or family being 46% for the treatment school and 36% for the comparison school. Compared to last year, this reported number one use went up for the treatment school (37% in 2005) and down for the comparison school (44% in 2005). Another interesting note in comparing the treatment school to the comparison school is how much more the comparison school students reported downloading and listening to music.

**Table 21a.**

*In your free time, what is your #1 use of technology? (Combined High Schools)*

	Frequency	Percent
Talking/emailing with friends or family members	1020	47.8
Playing games	271	12.7
Listening and downloading music	205	9.6
Getting information about places to go and things to do	237	11.1
I only use technology for my schoolwork.	184	8.6
I don't have any access to the Internet outside of school	177	8.3
Did Not Respond	40	1.9
Total	2134	100.0

**Table 21b.***In your free time, what is your #1 use of technology? (de Zavala Middle School)*

	Frequency	Percent
Talking/emailing with friends or family members	289	46.3
Playing games	129	20.7
Listening and downloading music	52	8.3
Getting information about places to go and things to do	46	7.4
I only use technology for my schoolwork.	48	7.7
I don't have any access to the Internet outside of school	49	7.9
Did Not Respond	11	1.8
Total	624	100.0

**Table 21c.***In your free time, what is your #1 use of technology? (Comparison Middle School)*

	Frequency	Percent
Talking/emailing with friends or family members	250	36.2
Playing games	148	21.4
Listening and downloading music	144	20.8
Getting information about places to go and things to do	32	4.6
I only use technology for my schoolwork.	34	4.9
I don't have any access to the Internet outside of school	77	11.1
Did Not Respond	6	.9
Total	691	100.0

Importance to Education. The overwhelming majority (91%) of the high school students in Irving felt that having access to technology is “important” or “very important” to their education, with the balance in favor of “very important” (49%) for Irving ISD high school students. As shown in Table 22a, only 7.7% felt that it is not very important. As shown in Tables 22b and 22c, the middle school students at both the treatment and comparison schools were very similar in their rating of the importance of access to technology.

**Table 22a.***How important do you think having access to technology is to your education?(Combined High Schools)*

	Frequency	Percent
Not very important	164	7.7
Important	890	41.7
Very Important	1045	49.0
Did Not Respond	35	1.6
Total	2134	100.0

**Table 22b.**

*How important do you think having access to technology is to your education? (de Zavala Middle School)*

	Frequency	Percent
Not very important	52	8.3
Important	272	43.6
Very Important	290	46.5
Did Not Respond	10	1.6
Total	624	100.0

**Table 22c.**

*How important do you think having access to technology is to your education? (Comparison Middle School)*

	Frequency	Percent
Not very important	42	6.1
Important	250	36.2
Very Important	388	56.2
Did Not Respond	11	1.6
Total	691	100.0

Change in Use of Technology. As shown in Table 23a many (42%) felt that having newer, better computers for student use was a desirable change. One noticeable difference from 2004 to 2005 to 2006 responses was that the percentage for “Have newer, better computers for student use” went from 25.9% to 31.6% to 42% respectively. Some high school students (18%) felt that allowing students to use instant messaging and email at school was a change they would make in the use of technology, down from last year when the percentage was 29%.

From the middle school students’ point of view, the number one thing they wish they could change (for both the treatment and comparison school) was allowing students to use IM and email at school. There was a difference between the treatment and comparison school regarding having newer and better computers for student use. Only 22% of the treatment school expressed this desire while 32% expressed it at the comparison school.

**Table 23a.**

*If you could change one thing about how technology is being used at your school today, what would that one thing be? (Combined High Schools)*

	Frequency	Percent
Have newer, better computers for student use	893	41.8
Have online classes for subjects that are not taught at my school	353	16.5
Have teachers use email to communicate with students more frequently	151	7.1
Have a more accurate, up to date school website	98	4.6
Use online textbooks	218	10.2
Allow students to use IM and email at school	384	18.0
Did Not Respond	37	1.7
Total	2134	100.0

**Table 23b.**

*If you could change one thing about how technology is being used at your school today, what would that one thing be? (de Zavala Middle School)*

	Frequency	Percent
Have newer, better computers for student use	134	21.5
Have online classes for subjects that are not taught at my school	101	16.2
Have teachers use email to communicate with students more frequently	70	11.2
Have a more accurate, up to date school website	36	5.8
Use online textbooks	75	12.0
Allow students to use IM and email at school	202	32.4
Did Not Respond	6	1.0
Total	624	100.0

**Table 23c.**

*If you could change one thing about how technology is being used at your school today, what would that one thing be? (Comparison Middle School)*

	Frequency	Percent
Have newer, better computers for student use	222	32.1
Have online classes for subjects that are not taught at my school	80	11.6
Have teachers use email to communicate with students more frequently	54	7.8
Have a more accurate, up to date school website	43	6.2
Use online textbooks	52	7.5
Allow students to use IM and email at school	225	32.6
Did Not Respond	15	2.2
Total	691	100.0

Obstacles to Student Use of Technology. As shown in Table 24a, the primary obstacles high school students reported facing in the use of technology in their schools were: 1) Slow access to the Internet (reported by 25%), 2) School filters and firewalls (reported by 22%), and 3) Computers don't work regularly (reported by 16%). Insufficient computers and computer locations or lack of time were rarely listed as obstacles. By contrast, lack of time in the school day was the number one obstacle to use of technology listed in the nationwide NetDay Survey (2004) and at the top of the list for the comparison middle school as shown in Table 24c.

For the middle schools, the responses were interesting. While the treatment school also listed their number one obstacle being "Slow access time to get on the Internet (19.6%), the comparison middle school listed "Not enough computers" (24.2%) followed closely by "Lack of time in the school day to use computers or access the Internet" (20.3%). It

was also interesting to note that a large percentage of the students at both middle schools listed “No obstacles or none of the above”.

**Table 24a.**

*What, if any, obstacles do you face in using technology at your school? (Combined High Schools)*

	Frequency	Percent
Not enough computers	63	3.0
Computers are not in a convenient location to use	55	2.6
Computers don't work regularly	340	15.9
Outdated software	83	3.9
Slow access time to get on the Internet	542	25.4
Lack of time in the school day to use computers or access the Internet	136	6.4
Limited teacher knowledge and skill	101	4.7
School filters and firewalls	461	21.6
I don't know how to use the technology at my school	10	.5
No obstacles or none of the above	291	13.6
Did Not Respond	52	2.4
Total	2134	100.0

**Table 24b.**

*What, if any, obstacles do you face in using technology at your school? de Zavala Middle School)*

	Frequency	Percent
Not enough computers	34	5.4
Computers are not in a convenient location to use	27	4.3
Computers don't work regularly	47	7.5
Outdated software	28	4.5
Slow access time to get on the Internet	122	19.6
Lack of time in the school day to use computers or access the Internet	77	12.3
Limited teacher knowledge and skill	30	4.8
School filters and firewalls	79	12.7
I don't know how to use the technology at my school	10	1.6
No obstacles or none of the above	158	25.3
Did Not Respond	12	1.9
Total	624	100.0

**Table 24c.**

*What, if any, obstacles do you face in using technology at your school? (Comparison Middle School)*

	Frequency	Percent
Not enough computers	167	24.2
Computers are not in a convenient location to use	17	2.5
Computers don't work regularly	22	3.2
Outdated software	12	1.7
Slow access time to get on the Internet	100	14.5
Lack of time in the school day to use computers or access the Internet	140	20.3
Limited teacher knowledge and skill	14	2.0
School filters and firewalls	45	6.5
I don't know how to use the technology at my school	5	.7
No obstacles or none of the above	152	22.0
Did Not Respond	17	2.5
Total	691	100.0

Most Effective Use of Technology. As shown in Table 25a, high schools students felt that technology was being used effectively in social studies/history (33% selected this area) and in English (22% selected this area). Art, music, and physical education were rarely selected. The nationwide survey showed science, social studies/history, and English as the top three, in that order (NetDay, 2004).

The two middle school groups had different rankings from the high school students and from each other. The treatment school group thought technology was most effectively used in science (27.9%), social studies/history (24%) and English (16.8%), the same order as the sample of students nationwide in the NetDay study. The comparison group of students listed English (28.5%), Science (22%) and yearbook or newspaper (20.3%).

**Table 25a.**

*In which subject area do you think technology is being used most effectively at your school? (Combined High Schools)*

	Frequency	Percent
English	469	22.0
Math	128	6.0
Science	162	7.6
Social Studies/History	704	33.0
Foreign Language	70	3.3
Art	24	1.1
Music	46	2.2
Physical Education	25	1.2
Yearbook or Newspaper	120	5.6
Career or Job Training	299	14.0
Did Not Respond	87	4.1
Total	2134	100.0

**Table 25b.**

*In which subject area do you think technology is being used most effectively at your school? (de Zavala Middle School)*

	Frequency	Percent
English	105	16.8
Math	59	9.5
Science	174	27.9
Social Studies/History	150	24.0
Foreign Language	3	.5
Art	4	.6
Music	13	2.1
Physical Education	3	.5
Yearbook or Newspaper	17	2.7
Career or Job Training	76	12.2
Did Not Respond	20	3.2
Total	624	100.0

**Table 25c.**

*In which subject area do you think technology is being used most effectively at your school? (Comparison Middle School)*

	Frequency	Percent
English	197	28.5
Math	80	11.6
Science	152	22.0
Social Studies/History	38	5.5
Foreign Language	1	.1
Art	2	.3
Music	9	1.3
Physical Education	10	1.4
Yearbook or Newspaper	140	20.3
Career or Job Training	49	7.1
Did Not Respond	13	1.9
Total	691	100.0

Frequent Uses of the Internet. As shown in Table 26, high school students frequently reported taking a test online (90%), writing a report based on information from the Internet (83%), emailing their teacher (76%) (up from 58% in 2005) and going to Web sites that have been set up for my school or class (69%) as things they do using the Internet. Three of these areas were also in the top three listed nationwide, but the order was 1) write a report, 2) go to websites, and 3) take an online test. Notable changes from 2004 and 2005 Irving data include an increase from 15.9% to 20.5% to 27.9% for contributing to a web log, an increase in creating Web pages for school projects (25% to 35%), and an increase in checking on class grades (44.8% to 53.6%).

For the middle school students the breakdown of the responses for both schools was similar to the high school students. However while the top three at the two middle schools are closely aligned, there are other large differences in uses between the two schools. The number top uses for both middle schools was “Take a test online”, “Write a report using information from the Internet”, and “Go to Websites that have been set up for my school or class”. The interesting differences are in checking grades online, e-mailing their teachers, and downloading a study guide. Those percentages can be viewed in Tables 26b and 26c.

**Table 26a.***Do you ever do the following using the Internet?(Combined High Schools)*

	Frequency	Percent
Write a report using information from the Internet	1770	82.9
Take a test online	1922	90.1
Create a web page for a school project	749	35.1
Contribute to a web log	596	27.9
Check on a class grade	1143	53.6
Take a class online	354	16.6
Download a study guide	1207	56.6
Get help from an online tutor	399	18.7
Go to websites that have been set up for my school or class	1473	69.0
Use Instant Messaging to talk to a classmate about a class project	1059	49.6
E mail a teacher	1611	75.5
Use an online textbook	1305	61.2
Create a movie	910	42.6

**Table 26b.***Do you ever do the following using the Internet?(de Zavala Middle School)*

	Frequency	Percent
Write a report using information from the Internet	431	69.1
Take a test online	492	78.8
Create a web page for a school project	192	30.8
Contribute to a web log	124	19.9
Check on a class grade	377	60.4
Take a class online	90	14.4
Download a study guide	276	44.2
Get help from an online tutor	88	14.1
Go to websites that have been set up for my school or class	398	63.8
Use Instant Messaging to talk to a classmate about a class project	245	39.3
E mail a teacher	309	49.5
Use an online textbook	166	26.6
Create a movie	192	30.8

**Table 26c.***Do you ever do the following using the Internet?(Comparison Middle School)*

	Frequency	Percent
Write a report using information from the Internet	479	69.3
Take a test online	524	75.8
Create a web page for a school project	139	20.1
Contribute to a web log	102	14.8
Check on a class grade	208	30.1
Take a class online	104	15.1
Download a study guide	131	19.0
Get help from an online tutor	88	12.7
Go to websites that have been set up for my school or class	415	60.1
Use Instant Messaging to talk to a classmate about a class project	270	39.1
E mail a teacher	154	22.3
Use an online textbook	165	23.9
Create a movie	200	28.9

Locations for Using Technology to Help with Schoolwork. High School students overwhelmingly selected “at my school” (62.4%) or “at home” (26.2%) as the most likely places for them to use technology with their schoolwork. As shown in Table 27a, a community center, the mall, or at a friend’s house were rarely reported. By contrast, in the 2003 nationwide survey 70% of the students reported “at home” as the most common place to use technology, and only 23% reported the most common place as “at my school” (NetDay, 2004). The Irving laptop initiative appears to have brought extensive computer use into the schools.

Both middle schools (treatment and comparison) reported their most common place to use technology to help with schoolwork was “at my school” as well also followed by “at home”.

**Table 27a.**

*When you are using technology to help with your schoolwork, where are you most likely to be? (Combined High Schools)*

	Frequency	Percent
At home	559	26.2
At my school	1332	62.4
At the public library	91	4.3
At a community center or after school club	30	1.4
At the mall	17	.8
At a friend's house	23	1.1
Did Not Respond	82	3.8
Total	2134	100.0

**Table 27b.**

*When you are using technology to help with your schoolwork, where are you most likely to be? (de Zavala Middle School)*

	Frequency	Percent
At home	180	28.8
At my school	380	60.9
At the public library	35	5.6
At a community center or after school club	3	.5
At the mall	5	.8
At a friend's house	10	1.6
Did Not Respond	11	1.8
Total	2134	100.0

**Table 27c.**

*When you are using technology to help with your schoolwork, where are you most likely to be? (Comparison Middle School))*

	Frequency	Percent
At home	183	26.5
At my school	370	53.5
At the public library	72	10.4
At a community center or after school club	4	.6
At the mall	2	.3
At a friend's house	42	6.1
Did Not Respond	18	2.6
Total	691	100.0

**Location of Technology Use in School.** As shown in Table 28a, 81% of the high school respondents reported “in a classroom” as the place they use technology most often in school. This appears to be by far the dominant location and eclipses all other locations, including the computer lab. By contrast, nationwide 60% of the students reported “in the computer lab” and only 28% reported “in my classroom” the most often place to use technology (NetDay, 2004). These 2006 reported frequencies are very similar to 2004

and 2005 high school student data in Irving.

As shown in Tables 28b and 28c, the responses for the treatment middle school students were similar with 83% reporting using technology most often in the classroom. However while the majority of students at the comparison middle school reported the classroom as the most common place to use technology, a computer lab was much more common at the comparison school than any of the laptop schools.

**Table 28a.**

*When you are at your school, where at school do you use technology most often? (Combined High Schools)*

	Frequency	Percent
In a classroom	1728	81.0
In a computer lab	84	3.9
In the school library	92	4.3
In the lunch room	71	3.3
In the college planning or guidance office	13	.6
I do not regularly use technology at my school	63	3.0
Did Not Respond	83	3.9
Total	2134	100.0

**Table 28b.**

*When you are at your school, where at school do you use technology most often? (de Zavala Middle School)*

	Frequency	Percent
In a classroom	516	82.7
In a computer lab	28	4.5
In the school library	16	2.6
In the lunch room	32	5.1
In the college planning or guidance office	4	.6
I do not regularly use technology at my school	16	2.6
Did Not Respond	12	1.9
Total	624	100.0

**Table 28c.**

*When you are at your school, where at school do you use technology most often? (Comparison Middle School)*

	Frequency	Percent
In a classroom	400	57.9
In a computer lab	163	23.6
In the school library	73	10.6
In the lunch room	0	0
In the college planning or guidance office	0	0
I do not regularly use technology at my school	37	5.4
Did Not Respond	18	2.6
Total	691	100.0

Perceived Level of Technology Proficiency. As shown in Tables 29a and 29b, the majority of the students at the laptop schools (63% - 65%) consider themselves an average user of technology – about the same as most other students in their schools. Roughly 1 in 5 consider themselves advanced. These proportions are similar to those found nationwide (NetDay, 2004) and similar to Irving 2004 and 2005 data findings. The comparison middle school students reported similar percentages. However, as shown in Table 29c, less of the students at the comparison school consider themselves to be advanced technology users.

**Table 29a.**

*Thinking about the other students at your school, do you consider yourself: (Combined High Schools)*

	Frequency	Percent
a beginner below the skills of most of the students at your school	180	8.4
an average tech user - the same as most of the students at your school	1388	65.0
an advanced tech user; more expert than most of the students at your school	479	22.4
Did Not Respond	87	4.1
Total	2134	100.0

**Table 29b.**

*Thinking about the other students at your school, do you consider yourself: (de Zavala Middle School)*

	Frequency	Percent
a beginner below the skills of most of the students at your school	95	15.2
an average tech user - the same as most of the students at your school	395	63.3
an advanced tech user; more expert than most of the students at your school	119	19.1
Did Not Respond	15	2.4
Total	624	100.0

**Table 29c.**

*Thinking about the other students at your school, do you consider yourself: (Comparison Middle School)*

	Frequency	Percent
a beginner below the skills of most of the students at your school	70	10.1
an average tech user - the same as most of the students at your school	495	71.6
an advanced tech user; more expert than most of the students at your school	105	15.2
Did Not Respond	21	3.0
Total	691	100.0

Use of Technology for Schoolwork. As shown in Table 30a, the vast majority of the Irving high school students (88%) reported that they use technology to help them with their schoolwork. This is very close to the percentage reported nationwide (NetDay, 2004) as well as the percentages reported for the Irving middle schools as shown in Tables 30b and 30c.

**Table 30a.**

*Do you use technology to help you with your schoolwork? (Combined High Schools)*

	Frequency	Percent
No	139	6.5
Yes	1882	88.2
No Response	113	5.3
Total	2134	100.0

**Table 30b.**

*Do you use technology to help you with your schoolwork? (de Zavala Middle School)*

	Frequency	Percent
No	48	7.7
Yes	554	88.8
No Response	22	3.5
Total	624	100.0

**Table 30c.**

*Do you use technology to help you with your schoolwork? (Comparison Middle School)*

	Frequency	Percent
No	132	19.1
Yes	523	75.7
No Response	336	5.2
Total	691	100.0

Most Frequently Used Technologies. High school students in Irving appear to make comparatively heavy use of their laptop computers. As shown in Table 31a, 88% of the high school students reported they make use of their laptop computer in a typical week. This value is the highest use rating among the technologies listed, surpassing use of cell phones (69% use weekly) and use of desktop computers (59% use weekly). By contrast, in the nationwide survey, laptop computers were reported 4<sup>th</sup> most frequently used, behind desktop computers, cell phones, and CD burners (NetDay, 2004). There were no notable changes from the 2004 or 2005 data.

The only notable differences for the middle school students were between the treatment and comparison schools in that the treatment schools report using laptops more but CD burners less and desktop computers less than the comparison middle school. There was no notable difference between these two schools in any of the other uses.

**Table 31a.**

*In a typical week for you, which of these technology products do you use, either in school or in your free time? (Combined High Schools)*

Item	Frequency	Percent
Desktop computer	1284	60.2
Laptop computer	1873	87.8
Cell phone	1466	68.7
PDA	147	6.9
Digital camera	1069	50.1
Digital Camcorder	382	17.9
Scanner	547	25.6
CD burner	918	43.0
MP3 Player	1111	52.1

**Table 31b.**

*In a typical week for you, which of these technology products do you use, either in school or in your free time? (de Zavala Middle School)*

Item	Frequency	Percent
Desktop computer	276	44.2
Laptop computer	558	89.4
Cell phone	322	51.6
PDA	42	6.7
Digital camera	262	42.0
Digital Camcorder	99	15.9
Scanner	100	16.0
CD burner	186	29.8
MP3 Player	288	46.2

**Table 31c.**

*In a typical week for you, which of these technology products do you use, either in school or in your free time? (Comparison Middle School)*

Item	Frequency	Percent
Desktop computer	413	59.8
Laptop computer	458	66.3
Cell phone	423	61.2
PDA	38	5.5
Digital camera	311	45.0
Digital Camcorder	128	18.5
Scanner	118	17.1
CD burner	331	47.9
MP3 Player	348	50.4

Types of Internet Tools Used. Irving high school students reported making weekly use of email (87% reported weekly use), Internet search engines (75%), and instant messaging (64% reported weekly use). As shown in Table 32a, few reported weekly use of chat rooms (16%). However the use of web logs increased from 14.4% in 2004 to 22.2% in 2005 to 27% in 2006. These values are similar to those reported by students in the nationwide survey (NetDay, 2004).

Most of the uses of Internet tools for the middle school students were similar to the high school students, with some exceptions in the areas of Instant Messaging and Email where the high school students use it more. Some differences exist between the treatment and comparison middle schools.

Note that a seemingly high percentage of students at both middle schools and the high schools report spending their free time on personal sites. A follow-up to determine what students are posting might be useful to parents and/or district personnel.

**Table 32a.**

*In a typical week for you, which of these Internet tools do you use, either in school or in your free time? (Combined High Schools)*

Item	Frequency	Percent
Email	1847	86.6
Instant Messaging	1361	63.8
Web log	571	26.8
Internet search engine	1603	75.1
Message boards	736	34.5
Specific Internet Websites that you already have bookmarked	1198	56.1
Personal site (ie My Yahoo)	1163	54.5
Chat rooms	340	15.9

**Table 32b.**

*In a typical week for you, which of these Internet tools do you use, either in school or in your free time? (de Zavala Middle School)*

Item	Frequency	Percent
Email	512	82.1
Instant Messaging	274	43.9
Web log	122	19.6
Internet search engine	350	56.1
Message boards	148	23.7
Specific Internet Websites that you already have bookmarked	214	34.3
Personal site (ie My Yahoo)	304	48.7
Chat rooms	140	22.4

**Table 32c.**

*In a typical week for you, which of these Internet tools do you use, either in school or in your free time? (Comparison Middle School)*

Item	Frequency	Percent
Email	485	70.2
Instant Messaging	294	42.5
Web log	115	16.6
Internet search engine	358	51.8
Message boards	135	19.5
Specific Internet Websites that you already have bookmarked	277	40.1
Personal site (ie My Yahoo)	334	48.3
Chat rooms	244	35.3

Frequency of Repair/Maintenance. As shown in Table 33a, approximately one-third (33%) of the high school students reported their laptop never needed technical support during the past year; approximately 31% reported needing technical support one time; and 25% reported needing support 2-3 times. Four percent reported needing technical support more than 7 times. These frequencies are very similar to those reported in 2004 and 2005.

The middle school treatment school reported the number of times this year their laptop needed technical support was: 31% never, 39% one time, 22% two to three times, 3% four to seven times and 3% more than seven times. This was quite different from last year with 19% reporting their laptops never needing technical support during the year.

**Table 33a.**

*How many times this year has your laptop needed technical support? (Combined High Schools)*

	Frequency	Percent
Never	699	32.8
1 time	654	30.6
2-3 times	537	25.2
4-7 times	82	3.8
More than 7 times	76	3.6
Did Not Respond	86	4.0
Total	2134	100.0

**Table 33b.**

*How many times this year has your laptop needed technical support? (de Zavala Middle School)*

	Frequency	Percent
Never	196	31.4
1 time	241	38.6
2-3 times	140	22.4
4-7 times	18	2.9
More than 7 times	17	2.7
Did Not Respond	12	1.9
Total	624	100.0

Promptness of Laptop Repairs. Irving high school students were evenly divided in their opinions about whether their laptops “seldom got repaired quickly” (31%) or “usually got repaired quickly (35%). As shown in Table 34a, 10% of the students responded that their laptops “always got repaired quickly.” For the treatment middle school, students reported the following regarding the quick repair of their laptops: 24% seldom, 36% usually, and 12% always (Table 34b).

**Table 34a.**

*Does your laptop get repaired quickly whenever it doesn't work properly? (Combined High Schools)*

	Frequency	Percent
Seldom	666	31.2
Usually	738	34.6
Always	204	9.6
Never had repairs	439	20.6
Did Not Respond	87	4.1
Total	2134	100.0

**Table 34b.**

*Does your laptop get repaired quickly whenever it doesn't work properly? (de Zavala Middle School)*

	Frequency	Percent
Seldom	152	24.4
Usually	223	35.7
Always	73	11.7
Never had repairs	161	25.8
Did Not Respond	15	2.4
Total	624	100.0

Use of Laptop by Others at Home. As shown in Table 35a, most high school students in Irving (64%) reported that no one else uses their laptop at home. However, another way of viewing this information is that more than one-fourth of the Irving high school students (32%) (n = 675) reported that their laptop is used by others at home. For the treatment middle school, 52% of the students reported that someone else at home uses their laptop. Last year only 19% of the middle school students reported that someone at home used their laptop. The change from last year to this year is quite dramatic.

**Table 35a.**

Does anyone else at home use your laptop computer? (Combined High Schools)

	Frequency	Percent
No	1364	63.9
Yes	675	31.6
Did Not Respond	95	4.5
Total	2134	100.0

**Table 35b.**

Does anyone else at home use your laptop computer? (de Zavala Middle School)

	Frequency	Percent
No	281	45.0
Yes	324	51.9
Did Not Respond	19	3.0
Total	624	100.0

Frequency of Laptop Use by Others at Home. As shown in Table 36a, 346 Irving high school students (16.2%) reported that someone else uses their laptop computer at home “every day” while another 283 (13%) reported that someone else uses their computer at home “once a week.” For the middle school treatment school, a larger percentage (24%) reported that someone uses their laptop computer at home “every day” as well as a larger percentage (19%) using it “once a week”. The middle school percentages from last year increased quite a bit this year.

**Table 36a.**

How often do they use your laptop computer? (Combined High Schools)

	Frequency	Percent
Never	1179	55.2
Once a month	237	11.1
Once a week	283	13.3
Every day	346	16.2
Did Not Respond	89	4.2
Total	2134	100.0

**Table 36b.***How often do they use your laptop computer? (de Zavala Middle School)*

	Frequency	Percent
Never	231	37.0
Once a month	111	17.8
Once a week	119	19.1
Every day	150	24.0
Did Not Respond	13	2.1
Total	624	100.0

Students Assisting Home Users. As shown in Table 37a, more than one-third (39.3%, n = 838) of the high school students who completed the Irving laptop survey reported helping train other persons who use their laptop at home. For the middle school treatment school students who reported that someone used their laptop at home, 51% reported helping them use it (up from 24% in 2005).

**Table 37a.***Do you help them? (Combined High Schools)*

	Frequency	Percent
No	1185	55.5
Yes	838	39.3
Did Not Respond	111	5.2
Total	2134	100.0

**Table 37b.***Do you help them? de Zavala Middle School)*

	Frequency	Percent
No	283	45.4
Yes	321	51.4
Did Not Respond	20	3.2
Total	624	100.0

Helping Home Users Find Things on the Internet. As shown in Table 38a, 949 Irving high school students (45%) reported showing other users of their laptop at home how to find things on the Internet. As shown in Table 28b, 52% of the middle school treatment school students reported showing family members at home how to find things on the Internet, up from 27% in 2005.

**Table 38a.***Do you show them how to find things on the Internet? (Combined High Schools)*

	Frequency	Percent
No	1069	50.1
Yes	949	44.5
Did Not Respond	116	5.4
Total	2134	100.0

**Table 38b.***Do you show them how to find things on the Internet? (de Zavala Middle School)*

	Frequency	Percent
No	277	44.4
Yes	327	52.4
Did Not Respond	20	3.2
Total	624	100.0

Desire to Keep Laptop After Graduation. As shown in Table 39a, 76% of the high school students in Irving expressed the opinion that keeping their laptop after graduation would be useful while 77% of the treatment middle school students reported the same (Table 39b).

**Table 39a.***Would keeping your laptop after you finish high school be useful to you? (Combined High Schools)*

	Frequency	Percent
Yes	1617	75.8
Not sure	304	14.2
No	120	5.6
Did Not Respond	93	4.4
Total	2134	100.0

**Table 39b.***Would keeping your laptop after you finish high school be useful to you? (de Zavala Middle School)*

	Frequency	Percent
Yes	478	76.6
Not sure	115	18.4
No	15	2.4
Did Not Respond	16	2.6
Total	624	100.0

## Language/Culture Identification and College Aspirations

Forty-six (46%) of the high school students responding to the Irving Laptop survey reported their ethnicity as Hispanic. Table 40 indicates that more than one-third (36%) of the respondents have a language other than English spoken as the primary language in their homes. Yet, as shown in Table 41, 78% of the Irving high school students expect to advance in school beyond the high school diploma. This high achievement desire, combined with the high attitude toward school reported for this group, implies there is great potential for these high school students to become productive citizens in society. Also, since a large number of students reported that their technology is being shared with one or more other person(s) in their family units at home (see Table 35), it would appear there is potential for the Irving School District initiatives to have positive impacts beyond the students who are allocated the laptops, and into the community as a whole. Further study is needed to determine the extent to which positive impact is taking place, and the ways in which it can best be further supported.

**Table 40.**

*Is English the primary language spoken in your home?*

	Combined HS		Treatment MS		Comparison MS	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
No	757	35.5	292	46.8	405	58.6
Yes	1276	59.8	308	49.4	255	36.9
Did Not Respond	101	4.7	24	3.8	31	4.5
Total	2134	100.0	624	100.0	691	100.0

**Table 41.**

*How far do you think you will go in school? (Combined High Schools)*

	Comb ined HS		Treatment MS		Compa rison MS	
	Frequ ency	Percent	Freq	Percent	Freq	Percent
Will not finish high school	29	1.4	14	2.2	7	1.0
High school diploma	149	7.0	80	12.8	48	6.9
2 year college degree	191	9.0	70	11.2	86	12.4
4 year college degree	652	30.6	114	18.3	121	17.5
Masters degree	493	23.1	123	19.7	132	19.1
Doctorate degree	321	15.0	90	14.4	104	15.1
Don't know	215	10.1	116	18.6	171	24.7
Did Not Respond	84	3.9	17	2.7	22	3.2
Total	2134	100.0	624	100.0	691	100.0

Open-Ended Comments. A wide variety of comments were received from high school students in Irving concerning their experiences with laptops. These can best be interpreted by educational leaders within the district and are listed, unedited, in Appendix A. Detailed analysis of these open-ended responses by persons knowledgeable about the Irving school environment may yield clues regarding the issue of how best to maintain and further nurture the positive student perceptions reported in the previous section.

### **Instructional Uses of Laptops in Classes**

Table 42 contains the options provided for rating by students (on a Likert scale of 1 to 5), comparing mean high school responses to mean treatment middle school responses. The activities appear to fall into three clusters of usage frequency:

1. Very Frequently: use email to communicate with other students; use electronic bulletin board (ex. Blackboard) to discuss academic content, issues, assignments
2. Frequently: access online databases, reference materials, newspapers & periodicals; work on projects that take one (1) week or more to complete; work on projects that apply critical thinking and problem solving skills; and work on a project, gather data, conduct an experiment or research project
3. Less Frequently: Access online libraries; design their own problems to solve; or use email to communicate with experts in their field.

These responses collectively indicate a healthy distribution of learning-related activities in the middle cluster, with possible concerns about the low incidence of students accessing online libraries, designing their own problems to solve or using email to seek advice from experts in a particular field – especially given the high incidence of email communication with other students reported for the top cluster. Opportunities may exist to target professional development in these low incidence areas, if they are perceived to be goals for educators and the district. These reported means are similar to last year.

**Table 42.**

*In class(es) where my teachers use laptop computers, students ...  
(Combined High Schools and de Zavala Middle School) 2006*

	Combined High Schools	De Zavala Middle School
	Mean (SD) n	Mean (SD) n
<b>Very Frequently</b>		
Use email to communicate with other students	3.17 (1.09) n = 2100	2.81 (1.24) n = 619
Use electronic bulletin board (ex. Blackboard) to discuss academic content, issues, assignments	3.01 (1.08) n = 2103	2.96 (1.09) n = 619
<b>Frequently</b>		
Access online databases, reference materials, newspapers & periodicals	2.67 (.97) n = 2105	2.61 (1.00) n = 619
Work on projects that take one (1) week or more to complete	2.66 (.88) n = 2096	2.61 (.90) n = 617
Work on projects that apply critical thinking and problem solving skills	2.63 (.98) n = 2091	2.65 (.99) n = 616
Work on a project, gather data, conduct an experiment or research project	2.63 (.93) n = 2101	2.55 (.86) n = 616
<b>Less Frequently</b>		
Access online libraries	2.22 (.96) n = 2500	2.43 (.94) n = 616
Design their own problems to solve	1.99 (1.07) n = 2102	2.02 (1.04) n = 615
Use email to communicate with experts in a particular field	1.96 (1.08) n = 2094	1.69 (1.01) n = 619

Note: 1 = never, 2 = monthly, 3 = weekly, 4 = daily.

### **Gender Differences**

Tables 43 through 45 contain descriptive statistics as well as levels of significance for the major indices recorded for Irving high school students, by gender for 2004, 2005 and 2006. While males made significantly ( $p < .05$ ) more use of information technology at home in 2004, each year since has shown a more narrow gap. Males and females appear to be equal in the amount of laptop use at home. Both males and females have increased their reported amount of laptop use at home since 2004. Females consistently reported more use of the World Wide Web in school. Females and males are equally comfortable with (not anxious about) computers. Some changes in gender differences from 2004 to 2006 include:

- gender differences in the amount of hours laptops are used at home is no longer significant; females went up from 2004 to 2006

- gender differences for Computer Enjoyment were significant in 2004 but not in 2005; females went up from 2004 to 2005 and remained high in 2006
- gender differences for Computer Importance were significant in 2004 but not in 2005; females went up from 2004 to 2005 and remained in 2006
- gender differences for Attitude Toward School were significant in 2004 and 2006 but not in 2005; males went up from 2004 to 2005 and back down in 2006 while girls went up each year
- gender differences for Total Technology Skills were significant in 2005 and 2006 but not in 2004; both males and females went up from 2005 to 2006. The items on the total tech skills that are not on the other skill measures include creating graphics for multimedia presentations and Web pages as well as creating videos

Other detailed comparisons can be conducted by the interested reader, based on the information in Tables 43 - 45.

**Table 43.**

*Descriptive Statistics for Four Irving High School Males Versus Female Laptop Project Measures, 2004*

Item	Gender	N	Mean	Std. Dev.	Sig.
Laptop Hours at Home	Male	1129	2.08	1.02	.000
	Female	1251	1.93	.95	
WWW at School	Male	1129	2.31	.92	.001
	Female	1251	2.43	.93	
Computer Enjoyment	Male	1129	4.05	.58	.000
	Female	1251	3.95	.57	
Computer Importance	Male	1129	3.97	.73	.019
	Female	1251	3.90	.73	
Computer Anxiety	Male	1129	4.14	.68	.442
	Female	1251	4.12	.66	
Attitude Toward School	Male	1129	2.80	.71	.000
	Female	1251	2.97	.75	
Technology Proficiency (TP)-Email	Male	1129	4.12	.97	.000
	Female	1251	4.31	.86	
TP-WWW	Male	1129	3.94	.88	.711
	Female	1251	3.95	.80	
TP-Integrated Applications	Male	1129	3.87	.90	.023
	Female	1251	3.95	.85	
TP-All Tech Skills	Male	1129	3.86	.81	.363
	Female	1251	3.89	.71	

**Table 44.**

*Descriptive Statistics for Four Irving High School Males Versus Female Laptop Project Measures, 2005*

	Gender	N	Mean	Std. Dev.	Sig.
Laptop Hours at Home	Male	1183	2.07	1.05	.113
	Female	1352	2.01	.99	
Computer Use at School	Male	1184	2.50	1.01	.062
	Female	1352	2.57	.95	
WWW at School	Male	1184	2.22	.95	.000
	Female	1352	2.37	.88	
Computer Enjoyment	Male	1184	4.04	.57	.486
	Female	1352	4.02	.58	
Computer Importance	Male	1184	3.95	.80	.958
	Female	1352	3.95	.75	
Computer Anxiety	Male	1184	4.17	.65	.229
	Female	1352	4.13	.67	
Attitude Toward School	Male	1184	3.00	.73	.945
	Female	1352	3.00	.72	
Technology Proficiency (TP) Email	Male	1184	4.03	1.08	.071
	Female	1352	3.96	1.11	
TP-WWW	Male	1184	3.82	.90	.051
	Female	1352	3.75	.93	
TP-Integrated Applications	Male	1184	3.83	.90	.083
	Female	1352	3.77	.93	
TP-All Tech Skills	Male	1184	3.53	.76	.036
	Female	1352	3.47	.79	

**Table 45.**

*Descriptive Statistics for Four Irving High School Males Versus Female Laptop Project Measures, 2006*

	Gender	N	Mean	Std. Dev.	Sig.
Laptop Hours at Home	Male	1023	2.23	1.05	.734
	Female	1111	2.24	1.03	
Computer Use at School	Male	1023	2.51	.99	.119
	Female	1111	2.58	.98	
WWW at School	Male	1023	2.25	.93	.001
	Female	1111	2.38	.90	
Computer Enjoyment	Male	1023	4.04	.61	.327
	Female	1111	4.01	.54	
Computer Importance	Male	1021	4.00	.72	.634
	Female	1109	3.99	.63	
Computer Anxiety	Male	1023	4.13	.73	.078
	Female	1111	4.18	.66	
Attitude Toward School	Male	1023	2.89	.76	.000
	Female	1111	3.12	.77	
Technology Proficiency (TP) Email	Male	1023	4.08	1.03	.000
	Female	1111	4.31	.90	
TP-WWW	Male	1023	3.92	.93	.107
	Female	1111	3.98	.82	
TP-Integrated Applications	Male	1023	3.90	.96	.002
	Female	1111	4.02	.83	
TP-All Tech Skills	Male	1023	3.70	.69	.013
	Female	1111	3.66	.75	

For the middle school students there were several areas of interesting similarities and differences by gender. As shown in Tables 46 and 47, Email skills were higher ( $p < .002$ ) among females for both the treatment and comparison schools. The same was true for Integrated Applications and Attitude Toward School. However, Computer Anxiety (reversed to represent Comfort) was more positive for females at the treatment school ( $p < .05$ ) while there was no significant difference between males and females at the comparison school ( $p = .812$ ). Conversely, use of the WWW was greater ( $p < .001$ ) among females than males at the comparison school site, but there was no significant difference by gender at the treatment school ( $p = .827$ ). These findings imply that laptop access may be an equalizer regarding gender access to and use of technology.

**Table 46.***Gender Differences for de Zavala (Treatment) Middle School, 2006*

Measurement Indices	Gender	N	Mean	Std. Dev	Sig
Home Use	Male	313	2.26	1.05	
	Female	311	2.28	1.02	.771
WWW Use	Male	313	1.83	1.01	
	Female	311	1.81	.95	.827
School Use	Male	313	2.11	.85	
	Female	311	2.14	.87	.666
TP-Email	Male	313	3.73	1.09	
	Female	311	4.00	1.03	.001
TP-WWW	Male	313	3.59	.88	
	Female	311	3.66	.89	.330
TP Integrated Applications	Male	313	3.56	.91	
	Female	311	3.78	.88	.002
TP-All Skills	Male	313	3.32	.71	
	Female	311	3.47	.72	.010
Computer Enjoyment	Male	313	4.08	.56	
	Female	311	4.14	.48	.137
Computer Importance	Male	312	3.96	.73	
	Female	310	4.03	.63	.215
Computer Anxiety	Male	313	4.10	.68	
	Female	311	4.21	.61	.037
Attitude Toward School	Male	313	3.01	.81	
	Female	311	3.30	.81	.000

**Table 47.***Gender Differences for Comparison Middle School, 2006*

Measurement Indices	Gender	N	Mean	Std. Dev	Sig
Home Use	Male	359	1.72	.90	
	Female	332	1.83	.90	.121
WWW Use	Male	359	1.55	.85	
	Female	332	1.73	.92	.008
School Use	Male	359	1.37	.57	
	Female	332	1.42	.59	.309
TP-Email	Male	359	3.65	1.05	
	Female	332	3.89	1.01	.002
TP-WWW	Male	359	3.74	.75	
	Female	332	3.81	.72	.184
TP Integrated Applications	Male	359	3.63	.91	
	Female	332	3.88	.72	.000
TP-All Skills	Male	359	3.36	.68	
	Female	332	3.51	.60	.002

Computer Enjoyment	Male	359	4.29	.47	
	Female	332	4.34	.46	.164
Computer Importance	Male	359	4.13	.60	
	Female	332	4.22	.55	.047
Computer Anxiety	Male	359	4.26	.52	
	Female	332	4.27	.56	.812
Attitude Toward School	Male	359	2.92	.76	
	Female	332	3.19	.73	.000

When comparing treatment to comparison school data, as shown in Table 48, the laptop initiative had a large effect for males (ES = 1.04) and females (ES = .83) on school use of computers. This is not surprising since one would assume having laptops for every student in each classroom would increase the opportunities for use. However, a less anticipated finding is that the laptop initiative also had a positive effect on males' (ES = .55) and females' (ES = .47) home use of computers, and on males' and females' home use of the World Wide Web (ES = .30 and .08 respectively). The smaller effect for females in home use of the WWW was initially puzzling, but a closer examination of the data in Table 48 reveals that female use of the WWW was relatively high even in the comparison school, so the implication is that male use of the WWW at home is reduced without the laptop technology in place. Note that both males and females in the treatment school reported greater use of the WWW at home than did the comparison school. Probably a sizable portion of the home use is related to school assignments.

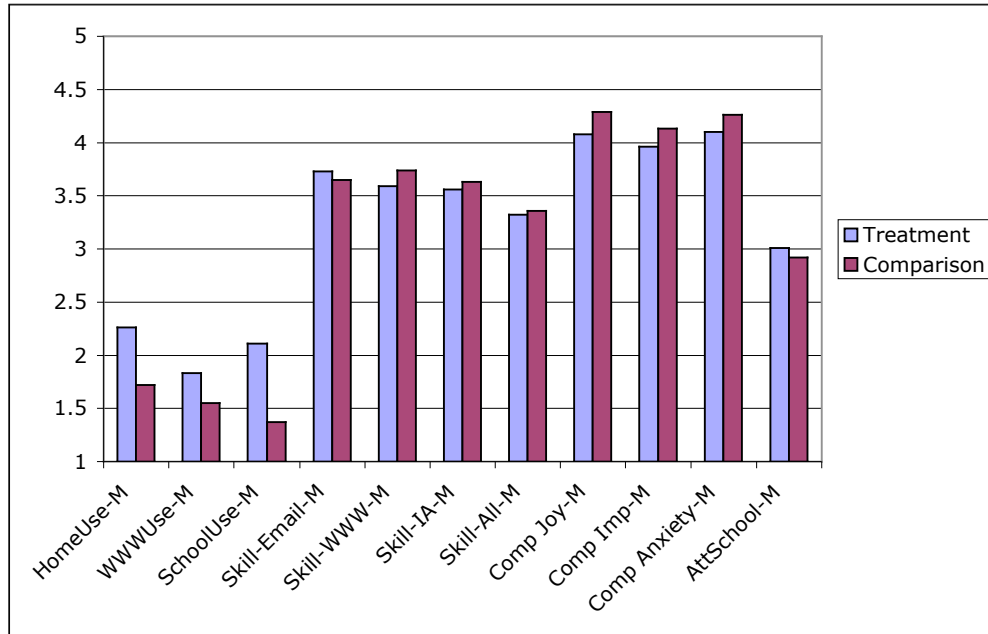
The data in Table 48 also indicate a probable positive impact of the laptop initiative on Email skills for males (ES = .07) and females (ES = .11). This outcome is not surprising since greater access to and practice with email is expected with laptops connected to the Internet. (Email was their number one use of technology in their free time.) A less anticipated outcome is the probable positive impact of the laptop initiative on Attitude Toward School for males (ES = .12) and females (ES = .14).

Several attitudinal and self-efficacy indicators appeared to be less positive among students in the treatment school than at the comparison school site. Among these were Integrated Applications and World Wide Web skills, plus Computer Anxiety, Computer Importance, and Computer Enjoyment. Effect sizes generally ranged from very small (-.08) to sufficiently small (-.27) so as not to be considered educationally meaningful. However, in the case of Computer Enjoyment, the effect sizes for males (-.41) and females (-.42) were well beyond the range that would be considered small, and surpassed the ES = .3 cutoff that is usually considered educationally meaningful (Bialo & Sivinkachala, 1996). The average reported rating on Computer Enjoyment at the comparison school site was quite high for males (mean = 4.29 on a 1-5 scale where 5 = strongly agree) and females (mean = 4.34 on a 1-5 scale). As shown in Table 48, comparable values for the treatment school are beyond 4.0 (agree that they enjoy computers) as well, for both males and females. Nevertheless, the treatment school reported level of computer enjoyment is significantly ( $p < .01$ ) lower than the comparison school for both males and females.

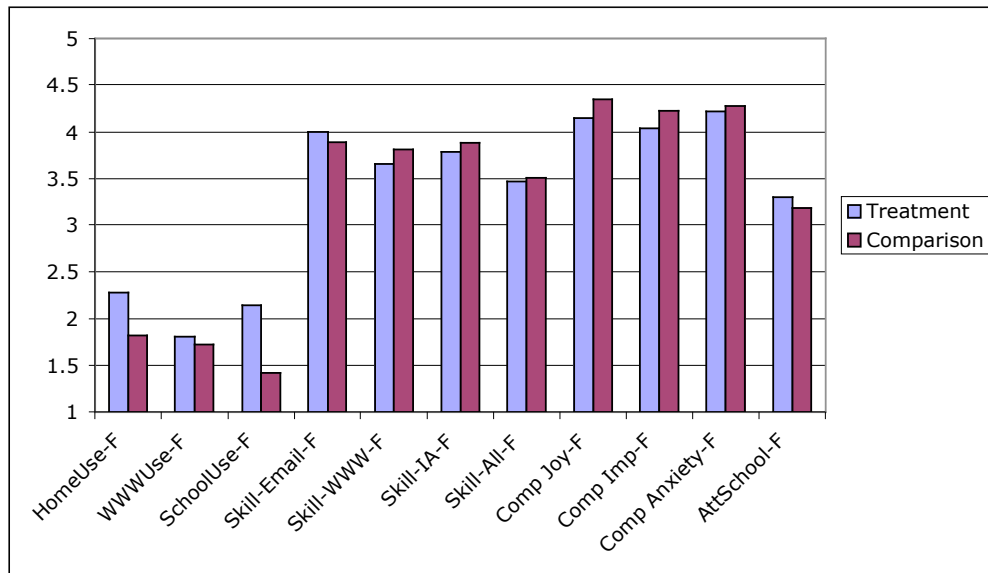
**Table 48.***Irving Treatment vs. Comparison Middle School by Gender, 2006*

Measurement Indices	Gender	N	Mean	Std. Dev	N	Mean	Std. Dev	Effect Size
		Treatment			Comparison			Cohen's d
Home Use	Male	313	2.26	1.05	359	1.72	.90	.55
	Female	311	2.28	1.02	332	1.83	.90	.47
WWW Use	Male	313	1.83	1.01	359	1.55	.85	.30
	Female	311	1.81	.95	332	1.73	.92	.08
School Use	Male	313	2.11	.85	359	1.37	.57	1.04
	Female	311	2.14	.87	332	1.42	.59	.83
TP-Email	Male	313	3.73	1.09	359	3.65	1.05	.07
	Female	311	4.00	1.03	332	3.89	1.00	.11
TP-WWW	Male	313	3.59	.88	359	3.74	.75	-.18
	Female	311	3.66	.89	332	3.81	.72	-.17
TP Integrated Applications	Male	313	3.56	.91	359	3.63	.91	-.08
	Female	311	3.78	.88	332	3.88	.72	-.11
TP-All Skills	Male	313	3.32	.71	359	3.36	.68	-.06
	Female	311	3.47	.72	332	3.51	.60	-.06
Computer Enjoyment	Male	313	4.08	.56	359	4.29	.47	-.41
	Female	311	4.14	.48	332	4.34	.46	-.42
Computer Importance	Male	312	3.96	.73	359	4.13	.60	-.26
	Female	310	4.03	.63	332	4.22	.55	-.30
Computer Anxiety	Male	313	4.10	.68	359	4.26	.52	-.27
	Female	311	4.21	.61	332	4.27	.56	-.10
Attitude Toward School	Male	313	3.01	.81	359	2.92	.76	.12
	Female	311	3.30	.81	332	3.19	.73	.14

Major trends regarding males and females are graphically displayed in Figures 1 and 2. Note the patterns of treatment-higher versus treatment-lower indices of measurement that appear to be similar for males and females.



**Figure 1.** Mean values for male treatment and comparison school subjects on computer attitude and learning disposition scales



**Figure 2.** Mean values for female treatment and comparison school subjects on computer attitude and learning disposition indices

## Summary and Conclusions

Surveys completed by 3449 Grade 6-12 students from the four Irving high schools, a TIP project treatment middle school and a comparison middle school enabled several trends to be derived for Irving ISD student perceptions toward computers in general and the laptop initiative specifically. Overall, the majority of students reported the main benefits of having extensive access to technology are that they can learn more and that school is more fun. In general, Irving students enjoy working with technology and enjoy learning new ways to use it. The overwhelming majority of surveyed middle school and high school students in Irving felt that having access to technology was “important” or “very important” to their education.

For each year that data have been collected (2004, 2005, 2006) in Irving, the number of students with home computer access as well as Internet access has increased. In addition, more than one-fourth of the high school students still report that they shared their laptop with someone else at home. However, for the treatment middle school, more than half of the students reported that someone else at home uses their laptop, an increase from one-fifth in 2005. More than half of these middle school students reported helping someone at home use their laptop.

Several additional trends emerged from the analysis of treatment versus comparison school data at the middle school level. First, a contrast regarding obstacles to student use of technology existed between the treatment middle school and comparison middle school. While the number one obstacle for the treatment school was slow access to the Internet, the top obstacles for the comparison school were not enough computers and lack of time in the day to access computers. Clearly, access to technology is not a problem at the treatment school with laptops for every student.

In the area of technology use, the three measures of home use, WWW use and school use were gathered. The treatment school was significantly higher ( $p < .0005$ ) in reported use than the comparison school on all three measures, with treatment effect sizes ranging from very large for school computer use ( $ES = 1.02$ ), to moderate for home computer use ( $ES = .52$ ), to small for WWW use ( $ES = .20$ ).

Attitude Toward School was also found to be significantly higher ( $p < .02$ ) in the treatment school with the laptop program. Although the overall effect would be classified as small ( $ES = .14$ ), even this small effect, when applied across an entire school, can be considered important according to guidelines provided by the North Central Regional Educational Laboratory (NCREL 2002).

Interestingly, the comparison school was found to be higher ( $p < .05$ ) on Computer Enjoyment, Computer Importance, and (lack of) Anxiety. The negative effect size of  $-.41$  for Computer Enjoyment may indicate that middle school students in the treatment school perceived working with computers more as “work” than their comparison school counterparts, even as the positive effect size for Attitude Toward School appears to indicate the laptop-based initiative promoted a more positive Attitude Toward School.

There were not large differences by gender in most areas assessed on the Computer Attitude Questionnaire in 2006. This finding is unlike those found in similar school districts in recent years, and may imply that ubiquitous, equal access promotes removal of historical gender-based differences in attitudes and skills. This trend is a continuation of the pattern first noted in the following excerpt from the 2005 report:

Male versus female differences in perceptions of information technology are present in the Irving middle school students and are generally consistent with those from other published sources. However, in some cases (e.g. lack of significant differences in hours of use of the computer at home in the TIP project school) there are indications that ubiquitous access is leading to gender equality in the perception of and use of information technology. In the high school data, the overall trend is even stronger for this contention. The trends for both males and females from 2004 to 2005, across all high schools where all students have their own laptops, is that the two genders are coming closer together on many major indices where they were previously far apart (Christensen & Knezek, 2005, p. 31).

Detailed analyses were run to compare gender and grade on eleven indices regarding computer attitudes, computer use and attitudes toward school. As shown in Figures 3 and 4, females were higher on Computer Enjoyment and Computer Importance in Grades 6, 7, and 8. However by Grade 9, females began going down below the level of the males' attitudes on Computer Enjoyment. Then again, by Grades 11 and 12, it appears that attitudes for both males and females were similar. The means, standard deviations, and significance levels for all indices by grade level and gender can be found in Appendix A.

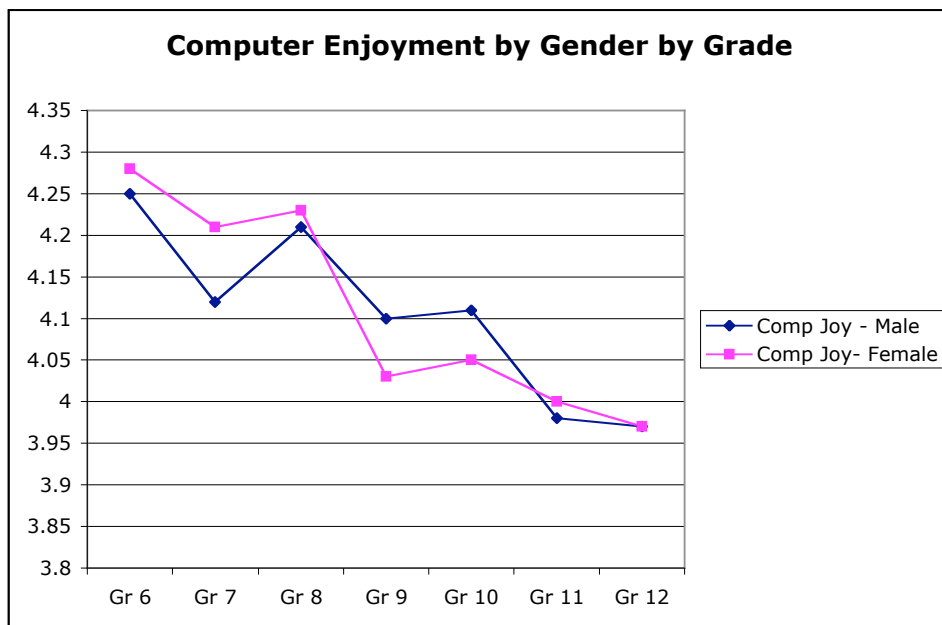


Figure 3. Computer Enjoyment by grade and gender for Irving 6<sup>th</sup> – 12<sup>th</sup> graders, 2006.

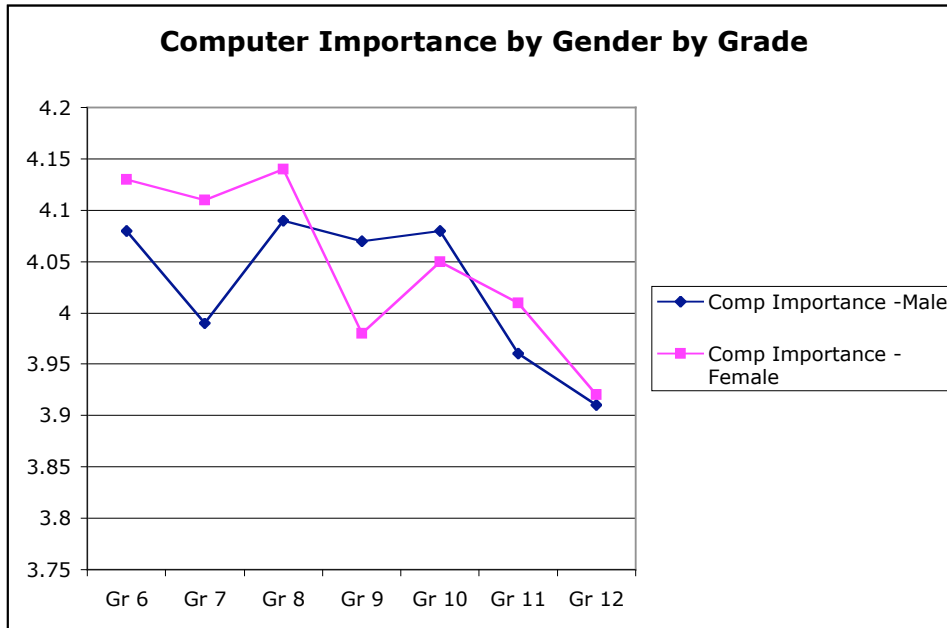


Figure 4. Computer Importance by grade and gender for Irving 6<sup>th</sup> – 12<sup>th</sup> graders, 2006.

There were several other differences in trends across grade levels.

- For sixth graders, females were significantly higher ( $p < .05$ ) than males on three indicators (TP-IA, TP-Skills and Attitude Toward School) yet were higher on all 11 of the indicators.
- For seventh graders, females were significantly higher ( $p < .05$ ) than males on seven indicators but higher on all 11 although four were not statistically significant at the  $p < .05$  level.
- For eighth graders, females were significantly higher than males on three indicators (TP-email, TP-IA and Attitude Toward School) and higher on all 11 (eight were not significant at the  $p < .05$  level).
- Ninth grade males were significantly higher ( $p < .05$ ) on Computer Importance and close to significantly higher ( $p = .078$ ) on Computer Enjoyment. Females were higher on six indicators but not at a statistically significant ( $p < .05$ ) level.
- For tenth graders, males were higher on three indicators (Computer Joy, Computer Importance and WWW use) but they were not significant at the  $p < .05$  level. Females were significantly higher on four indicators (TP-email, TP-IA, TP-skills and Attitude Toward School).
- For eleventh graders, females were significantly ( $p < .01$ ) higher on two indicators (TP-email and Attitude Toward School). Males were higher on three indicators (Home Use, WWW use and School use) but they were not significantly different at the  $p < .05$  level.

- For twelfth graders, females were significantly higher ( $p < .05$ ) on two indicators (TP-email and Attitude Toward School). Females were close to significantly higher on two more indicators (School use,  $p = .059$  and Home use,  $p = .073$ ).

By twelfth grade, males and females were very similar on most indicators. An example of this equalization process is graphically displayed in Figure 5. Effect sizes were calculated for female versus male differences in Computer Enjoyment at grade levels 6 through 12. Cohen's  $d$ , which is based on the mean rating for females, minus the mean rating for males, with the result divided by the pooled standard deviation of the two groups, was used for the effect size measure (Cohen, 1969). Previously reported trends for transition points in the gender gap for Computer Enjoyment (Christensen, Knezek, & Overall, 2005) were also present in the 2006 Irving data, but the peak occurred approximately two years later (at Grade 7) than had previously been reported. The rapid decline in female positive dispositions toward Computer Enjoyment that have been previously reported for Texas school district data (Christensen, Knezek, & Overall, 2005) were also found in the Irving 2006 data, but the low point for females occurred approximately one year later than previously reported, at Grade 9. New information that is especially encouraging in Figure 5 is that female and male enjoyment of computers appears to equalize by Grades 11 - 12. This finding would be good news to most parents of teenage girls.

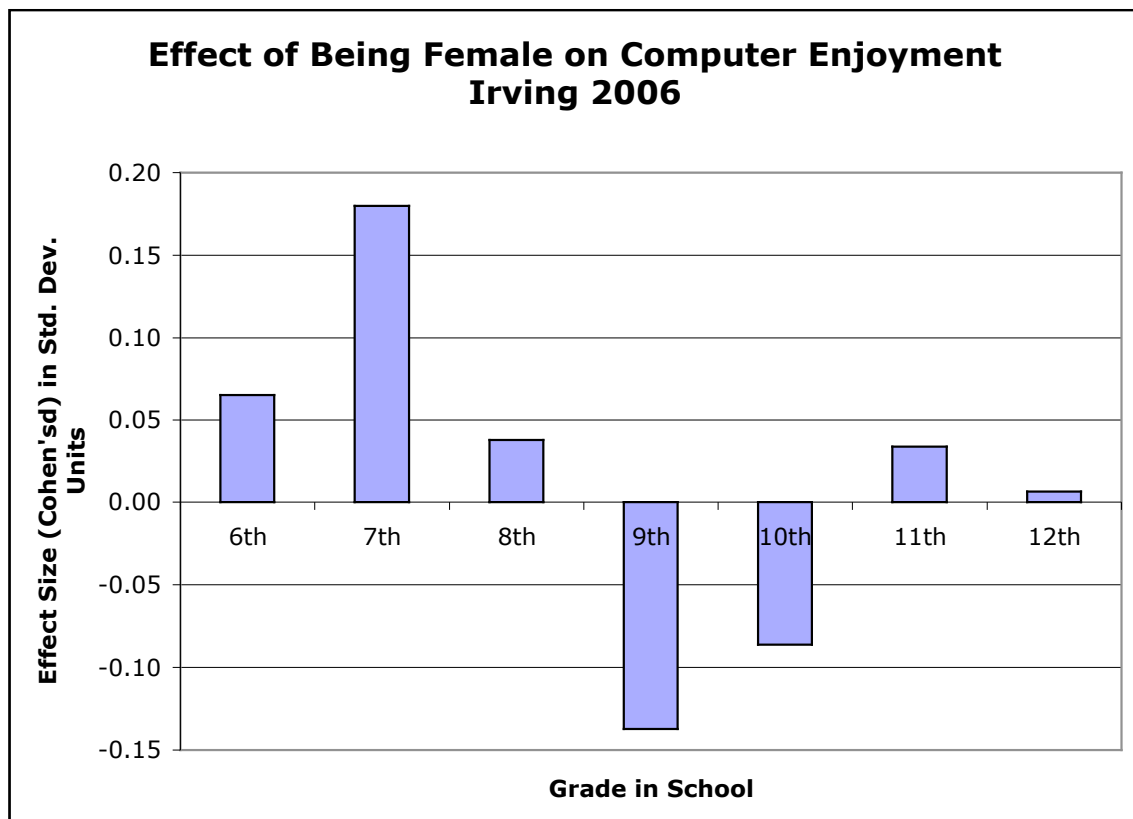


Figure 5. Effect sizes for female versus male self-reported ratings of Computer Enjoyment, grades 6 through 12 in Irving ISD, May 2006.

## Appendix A. Measurement Indices by Grade Level and Gender for Irving Students Grades 6 – 12, 2006

Note: Only significance levels at the  $p < .05$  were included in the tables below.  
For gender, 1 = Male, 2 = Female.

### Grade 6

	Gender	N	Mean	Std. Deviation	Sig
Home Use	1.00	217	2.0000	.97658	
	2.00	202	2.0149	.96958	
	Total	419	2.0072	.97207	
WWW Use	1.00	217	1.6728	.92739	
	2.00	202	1.7129	.92867	
	Total	419	1.6921	.92711	
School Use	1.00	217	1.5714	.71084	
	2.00	202	1.6139	.73937	
	Total	419	1.5919	.72418	
TP-Email	1.00	217	3.5499	1.09135	
	2.00	202	3.8020	1.14671	
	Total	419	3.6714	1.12413	
TP-Www	1.00	217	3.6832	.78035	
	2.00	202	3.7265	.84259	
	Total	419	3.7041	.81026	
TP-IA	1.00	217	3.5561	.90270	.001
	2.00	202	3.8482	.82260	
	Total	419	3.6969	.87626	
TP-Skills	1.00	217	3.2815	.68620	.007
	2.00	202	3.4634	.68263	
	Total	419	3.3692	.68970	
Computer Enjoyment	1.00	217	4.2472	.44417	
	2.00	202	4.2785	.46716	
	Total	419	4.2623	.45512	
Computer Importance	1.00	217	4.0826	.62613	
	2.00	201	4.1272	.55414	
	Total	418	4.1041	.59232	
Computer Anxiety	1.00	217	4.2178	.55874	
	2.00	202	4.2517	.54674	
	Total	419	4.2341	.55259	
Attitude Toward School	1.00	217	3.1266	.82642	.002
	2.00	202	3.3674	.72723	
	Total	419	3.2427	.78851	

## Grade 7

	Gender	N	Mean	Std. Deviation	Sig
Home Use	1.00	235	1.8723	1.02150	
	2.00	207	1.9372	.96084	
	Total	442	1.9027	.99296	
WWW Use	1.00	235	1.6085	.86227	
	2.00	207	1.7343	.88237	
	Total	442	1.6674	.87302	
School Use	1.00	235	1.7787	.79123	
	2.00	207	1.8164	.77279	
	Total	442	1.7964	.78199	
TP-Email	1.00	235	3.6170	1.01737	.002
	2.00	207	3.9034	.93840	
	Total	442	3.7511	.99046	
TP-Www	1.00	235	3.5085	.76302	.042
	2.00	207	3.6582	.77469	
	Total	442	3.5786	.77127	
TP-IA	1.00	235	3.5773	.82175	.024
	2.00	207	3.7440	.70629	
	Total	442	3.6554	.77347	
TP-Skills	1.00	235	3.2700	.61223	.004
	2.00	207	3.4344	.59142	
	Total	442	3.3470	.60747	
Computer Enjoyment	1.00	235	4.1187	.51429	.049
	2.00	207	4.2130	.48808	
	Total	442	4.1629	.50383	
Computer Importance	1.00	235	3.9852	.63005	.035
	2.00	207	4.1140	.64730	
	Total	442	4.0456	.64070	
Computer Anxiety	1.00	235	4.1229	.61128	
	2.00	207	4.2153	.59724	
	Total	442	4.1662	.60582	
Attitude Toward School	1.00	235	2.8848	.76734	.000
	2.00	207	3.2651	.75204	
	Total	442	3.0629	.78276	

## Grade 8

	Gender	N	Mean	Std. Deviation	Sig
Home Use	1.00	220	2.0455	1.02379	
	2.00	234	2.1752	1.01452	
	Total	454	2.1123	1.01997	
WWW Use	1.00	220	1.7545	1.01753	
	2.00	234	1.8462	.98151	
	Total	454	1.8018	.99907	
School Use	1.00	220	1.7909	.88720	
	2.00	234	1.8590	.91329	
	Total	454	1.8260	.90040	
TP-Email	1.00	220	3.8955	1.07821	.018
	2.00	234	4.1168	.90652	
	Total	454	4.0095	.99848	
TP-Www	1.00	220	3.8216	.87209	
	2.00	234	3.8344	.76195	
	Total	454	3.8282	.81629	
TP-IA	1.00	220	3.6606	1.00024	.003
	2.00	234	3.9174	.81522	
	Total	454	3.7930	.91761	
TP-Skills	1.00	220	3.4734	.76087	
	2.00	234	3.5759	.65105	
	Total	454	3.5263	.70748	
Computer Enjoyment	1.00	220	4.2058	.59068	
	2.00	234	4.2332	.47708	
	Total	454	4.2199	.53472	
Computer Importance	1.00	219	4.0938	.73715	
	2.00	234	4.1449	.58414	
	Total	453	4.1202	.66229	
Computer Anxiety	1.00	220	4.2176	.64296	
	2.00	234	4.2436	.59928	
	Total	454	4.2310	.62028	
Attitude Toward School	1.00	220	2.8787	.73993	.001
	2.00	234	3.1219	.78698	
	Total	454	3.0041	.77334	

## Grade 9

	Gender	N	Mean	Std. Deviation	Sig
Home Use	1.00	276	2.3478	.95462	
	2.00	288	2.2292	.97150	
	Total	564	2.2872	.96425	
WWW Use	1.00	276	1.7681	1.00029	
	2.00	288	1.6875	.89106	
	Total	564	1.7270	.94611	
School Use	1.00	276	2.4891	.90044	
	2.00	288	2.4931	.93329	
	Total	564	2.4911	.91655	
TP-Email	1.00	276	3.8986	1.04687	.005
	2.00	288	4.1412	.99326	
	Total	564	4.0225	1.02615	
TP-Www	1.00	276	3.7473	.92109	
	2.00	288	3.8455	.89130	
	Total	564	3.7974	.90653	
TP-IA	1.00	276	3.7548	.97477	
	2.00	288	3.8484	.93692	
	Total	564	3.8026	.95593	
TP-Skills	1.00	276	3.4696	.78919	
	2.00	288	3.5633	.77285	
	Total	564	3.5175	.78161	
Computer Enjoyment	1.00	276	4.1032	.49809	
	2.00	288	4.0281	.51263	
	Total	564	4.0649	.50651	
Computer Importance	1.00	276	4.0727	.58380	.050
	2.00	288	3.9758	.58753	
	Total	564	4.0232	.58719	
Computer Anxiety	1.00	276	4.1604	.64001	
	2.00	288	4.1641	.64408	
	Total	564	4.1623	.64152	
Attitude Toward School	1.00	276	2.9405	.69285	.000
	2.00	288	3.1895	.72873	
	Total	564	3.0676	.72161	

## Grade 10

	Gender	N	Mean	Std. Deviation	Sig
Home Use	1.00	223	2.3363	1.11859	
	2.00	255	2.3529	1.03527	
	Total	478	2.3452	1.07384	
WWW Use	1.00	223	1.8655	1.09455	
	2.00	255	1.8314	1.08270	
	Total	478	1.8473	1.08723	
School Use	1.00	223	2.5336	1.02995	
	2.00	255	2.6392	1.00159	
	Total	478	2.5900	1.01522	
TP-Email	1.00	223	4.0448	1.09370	.001
	2.00	255	4.3399	.85187	
	Total	478	4.2022	.98226	
TP-Www	1.00	223	3.9271	.97838	
	2.00	255	3.9873	.76468	
	Total	478	3.9592	.87050	
TP-IA	1.00	223	3.8296	1.02270	.002
	2.00	255	4.0928	.79512	
	Total	478	3.9700	.91690	
TP-Skills	1.00	223	3.5847	.85355	.034
	2.00	255	3.7315	.65616	
	Total	478	3.6630	.75744	
Computer Enjoyment	1.00	223	4.1089	.61300	
	2.00	255	4.0539	.55884	
	Total	478	4.0796	.58476	
Computer Importance	1.00	222	4.0817	.74897	
	2.00	254	4.0542	.65496	
	Total	476	4.0670	.69976	
Computer Anxiety	1.00	223	4.1980	.73665	
	2.00	255	4.2013	.65978	
	Total	478	4.1998	.69596	
Attitude Toward School	1.00	223	2.8955	.83219	.024
	2.00	255	3.0613	.76304	
	Total	478	2.9840	.79950	

## Grade 11

	Gender	N	Mean	Std. Deviation	Sig
Home Use	1.00	245	2.2408	1.03779	
	2.00	287	2.2230	.99250	
	Total	532	2.2312	1.01269	
WWW Use	1.00	245	1.7429	1.02189	
	2.00	287	1.7352	1.01367	
	Total	532	1.7387	1.01651	
School Use	1.00	245	2.5510	1.04138	
	2.00	287	2.5470	1.01925	
	Total	532	2.5489	1.02853	
TP-Email	1.00	245	4.1197	1.01411	.011
	2.00	287	4.3252	.83224	
	Total	532	4.2306	.92527	
TP-Www	1.00	245	3.9520	.89568	
	2.00	287	4.0087	.75286	
	Total	532	3.9826	.82141	
TP-IA	1.00	245	3.9551	.93128	
	2.00	287	4.0499	.70036	
	Total	532	4.0063	.81545	
TP-Skills	1.00	245	3.6405	.76749	
	2.00	287	3.7119	.60382	
	Total	532	3.6790	.68434	
Computer Enjoyment	1.00	245	3.9829	.65867	
	2.00	287	4.0046	.52556	
	Total	532	3.9946	.59012	
Computer Importance	1.00	245	3.9603	.72893	
	2.00	287	4.0095	.57519	
	Total	532	3.9868	.65035	
Computer Anxiety	1.00	245	4.0754	.76441	
	2.00	287	4.1790	.63960	
	Total	532	4.1313	.70108	
Attitude Toward School	1.00	245	2.8656	.73484	.000
	2.00	287	3.1279	.79619	
	Total	532	3.0071	.77890	

## Grade 12

	Gender	N	Mean	Std. Deviation	Sig
Home Use	1.00	279	2.0108	1.05763	
	2.00	281	2.1744	1.09944	
	Total	560	2.0929	1.08096	
WWW Use	1.00	279	1.6344	.98315	
	2.00	281	1.7544	1.05907	
	Total	560	1.6946	1.02280	
School Use	1.00	279	2.4839	1.00659	.059
	2.00	281	2.6406	.95000	
	Total	560	2.5625	.98087	
TP-Email	1.00	279	4.2378	.95315	.025
	2.00	281	4.4140	.89831	
	Total	560	4.3262	.92940	
TP-Www	1.00	279	4.0735	.89813	
	2.00	281	4.0872	.88462	
	Total	560	4.0804	.89060	
TP-IA	1.00	279	4.0609	.90731	
	2.00	281	4.0866	.86969	
	Total	560	4.0738	.88793	
TP-Skills	1.00	279	3.7621	.78719	
	2.00	281	3.7698	.73472	
	Total	560	3.7659	.76064	
Computer Enjoyment	1.00	279	3.9659	.65681	
	2.00	281	3.9699	.57449	
	Total	560	3.9679	.61633	
Computer Importance	1.00	278	3.9114	.80903	
	2.00	280	3.9200	.71378	
	Total	558	3.9157	.76205	
Computer Anxiety	1.00	279	4.0829	.76691	
	2.00	281	4.1820	.68781	
	Total	560	4.1326	.72933	
Attitude Toward School	1.00	279	2.8688	.79397	.000
	2.00	281	3.1087	.81321	
	Total	560	2.9892	.81189	